ALGEBRA.

78. Proposed by J. MARCUS BOORMAN, Consultative Mechanician, Counselor at Law, Inventor, Etc., Hewlett, Long Island, New York.

Solve $x^2 + xy = 10 \ldots\ldots (1)$; $y^2 + xy = 15 \ldots\ldots (2)$, for all the roots, and prove that they are the roots.

[Former solutions in print are defective. See *Analyst*, Vol. VIII, page 111; Vol. IX, page 53. J. M. B.]

79. Proposed by C. W. M. BLACK, A. M., Professor of Mathematics in Wesleyan Academy, Wilbraham, Massachusetts.

Of n persons A, B, C, etc., A first gives to the others as much as each of them already has; then B gives to the others as much as each then has; and so on for each in turn. Finally, A, B, C, etc., have respectively a, b, c, etc., dollars. How much had each at first?

80. Proposed by G. B. M. ZERR, A. M., Ph. D., Texarkana, Arkansas.

Solve $1+x^4 = a(1+x)^4$.

GEOMETRY.

74. Proposed by ROBERT JUDSON ALEY, M. A., Professor of Mathematics in Indiana University, Fellow in Mathematics, University of Pennsylvania.

Let O be the center of the inscribed circle. AO produced meets the circumcircle in A'. Find the ratio of AO to OA'.

75. Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy in Ohio University, Athens, Ohio.

A plane passes through $(0, 0, c)$ and touches the circle $x^2 + y^2 = a^2$, $z=0$; determine the locus of the ultimate intersections of the plane.

76. Proposed by L. B. FRAKER, Bowling Green, Ohio.

Lines run from a point, P, within a triangular piece of land to the angles A, B, and C are 91, 102, and 80 rods, respectively; and a line 78 rods in length passing through the point, P, and terminating in the sides AC and BC cuts off 3024 square rods adjacent to angle C. Required the dimensions of the land.

CALCULUS.

65. Proposed by GEORGE LILLEY, Ph. D., LL. D., Portland, Oregon.

A string is wound spirally 100 times around a cone 100 feet high and 2 feet in diameter at the base. Through what distance will a duck swim in unwinding the string keeping it taut at all times, the cone standing on its base and at right angles to the surface of the water?

66. Proposed by J. K. ELLWOOD, A. M., Principal of Colfax School, Pittsburg, Pennsylvania.

Around the top of a conical frustum,—base 5 feet, top 1 foot, altitude 100 feet,—is wound a rope 100 feet long and 1 inch thick. It is unwound by a hawk flying in one plane. How far does Mr. Hawk fly?

67. Proposed by BENJ. F. YANNEY, A. M., Professor of Mathematics in Mount Union College, Alliance, Ohio.

A man starts to walk at a uniform rate across a draw-bridge just as it begins to move. He walks the full length of the bridge and back, in the same time that it takes the bridge to make a half revolution. How far does he ride, the length of the bridge being 250 feet, and its velocity uniform about a center axis?